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THE GENUINENESS OF HYPNOTICALLY PRODUCED ANESTHESIA OF THE SKIN

By FRANK A. PATTIE, JR., The Rice Institute

How 'real' or 'genuine' are the anesthesias produced by hypnotic suggestion? Many recent authorities believe that such anesthesias are genuine, *i.e.* that they show all the characteristics of organic anesthesias except, of course, that they are produced and removed by suggestion.

For example, McDougall explicitly states his opinion that these anesthesias are genuine and involve an actual interruption of functional continuity of neurones.[1] Most other writers simply state that anesthesias of the sense-organs can be produced in the hypnotic trance and leave the matter there without any neurological or other theory and without any questioning of their genuineness.[2] On the other hand, there has been lately expressed a considerable amount of skepticism on this subject. Dorcus and Shaffer recognize the existence of the problem of the nature of anesthesia, saying, "whether pain is felt to any degree when anesthesia is suggested is a question still not satisfactorily answered. . . . The arm or hand of a hypnotized subject can be burned or cut without any observable signs. Nevertheless, there is a sensation of pain, since if the subject is re-hypnotized and told to recall his experiences, he will state that pain was experienced."[3] It cannot be said that these authors arrive at any conclusions on this subject. Hull, in his recent work,[4] shows an attitude of healthy skepticism but seems not to go, so far as a general theory is concerned, beyond the conclusions reached by his former student Sears in his study of hypnotic analgesia, which is discussed below.

Indeed, we can hardly blame these authors for not developing any general conception of hypnotic anesthesia, since up to the present not much experimentation has been reported. Bechterew,[5] in a short article, states that, when analgesia of the skin is produced, stimulation by pricking fails to elicit the normal respiratory, cardiac, and pupillary reactions. He gives several Russian references, which presumably contain the data upon which his conclusions are based. It is well established that the galvanic skin reflex occurs when hypnotically anesthetized receptors are stimulated.[6]

* Accepted for publication, June 15, 1936. The substance of this paper was presented at the meeting of the Southern Society for Philosophy and Psychology at Atlanta in April, 1936. The writer wishes to express his gratitude here to a former student, Miss Katherine Dionne, who served as a volunteer assistant in the work on normal Ss.

[1] W. McDougall, *Outline of Abnormal Psychology,* 1926, 89.

[2] For example, H. Banister, *Psychology and Health,* 1935, 127; E. S. Conklin, *Principles of Abnormal Psychology,* 1935, 333.

[3] R. M. Dorcus and G. W. Shaffer, *Textbook of Abnormal Psychology,* 1934, 190.

[4] C. L. Hull, *Hypnosis and Suggestibility,* 1933, 250-270. Pp. 256-267 summarize the experiment of Sears.

[5] M. W. de Bechterew, Des signes objectifs de la suggestion pendant le sommeil hypnotique, *Arch. de Psychol.,* 5, 1905, 103-107.

[6] M. Levine, Psychogalvanic reaction to painful stimuli in hypnotic and hysterical anesthesia, *Bull. Johns Hopkins Hosp.,* 46, 1930, 331-339; J. B. Dynes, An experi-

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Sears says that its magnitude is reduced by about 20% when painful stimulation is applied; Dynes says that there is a "slight decrease." The others give no quantitative data.

Dynes studied the effect of hypnotic analgesia and deafness on respiratory and cardiac reactions occurring after strong stimulation. He found that suggestions of anesthesia result practically in an abolition of the respiratory and cardiac changes which normally occur after a pistol shot or after a painful sharp stimulus is applied to the skin. Sears performed a similar experiment but restricted his observations to the comparison of the physiological changes occurring when the two legs of a *S* are painfully stimulated, when one leg has been made analgesic. The physiological changes most susceptible to voluntary control were most reduced; the facial flinch and the increase in respiratory oscillation and variability were practically eliminated. Pulse oscillation and pulse variability were reduced 77% and 50%, respectively. Hull connects this relative non-modifiability of the cardiac reactions to the fact that these reactions are not under voluntary control. Dynes states that no changes in the normal cardiac "rate and rhythm" occur after stimulation of the anesthetized sense-organs; but, since he did not apply to his records the refined measurements of "oscillation" and "variability" developed by Hull and used by Sears, it is possible that there would be no such great difference between Sears and Dynes on this point if both sets of data were treated in the same way. Sears concluded from certain control experiments, in which the *S*s were directed to simulate an anesthesia (in the normal state, however, not while in the trance), "that hypnotic anesthesia is in any sense a conscious simulation seems doubtful. Voluntary inhibition of reaction to pain does not present a picture even remotely resembling the reaction under true hypnotic anesthesia." Dynes likewise found that his *S*s could not inhibit the cardiac and respiratory reactions to pain and to the sound of the pistol.

The present writer attempted to produce uniocular blindness by hypnotic suggestion in 5 *S*s, but in no case was he successful.[7] He was deceived by one very clever *S*, who faked certain visual tests in such a way as to give the appearance that one eye was actually blind. For a long time he believed that a genuine blindness had been produced in this *S*, but finally he contrived a complicated filter-test which showed that the *S* was not blind. In the report of this work the methods used by the *S* in faking the tests have been discussed, and a considerable amount of evidence has been presented to show that the conative tendencies which led the *S* to simulate blindness were dissociated from her principal integrate of personality, and that she actually believed that she was blind in one eye, even when she was doing all she could to pass the tests, either by utilizing her knowledge of vision or by furtively disobeying instructions. Another *S* simulated blindness, but he was easily detected by the tests.

A complete history of this problem should include a reference to the work of Lundholm,[8] although his experiments are not altogether relevant to the work here

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mental study in hypnotic anesthesia, *J. Abnor. & Soc. Psychol.*, 27, 1932, 79-88; R. R. Sears, An experimental study of hypnotic anesthesia, *J. Exper. Psychol.*, 15, 1932, 1-22; Dorcus and Shaffer, *op. cit.*, 94-96.

[7] F. A. Pattie, Jr., A report of attempts to produce uniocular blindness by hypnotic suggestion, *Brit. J. Med. Psychol.*, 15, 1935, 230-241.

[8] H. Lundholm, An experimental study of functional anesthesias as induced by suggestion in hypnosis, *J. Abnor. & Soc. Psychol.*, 23, 1929, 337-355.

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reported. He produced anesthesias in the post-hypnotic period and for particular impressions; they were not anesthesias involving all impressions from a given sense-organ.

THE EXPERIMENT

The experiment reported here is so simple that it could have been performed just as well a hundred years ago, when the French Academy of Medicine appointed a committee (which reported negatively) to investigate the alleged anesthesias produced by the magnetist Berna.[9] The experiment starts from this fact. If a person clasps his hands in the position of the 'Japanese illusion' and tries to count the number of times he is touched on one hand (the right or the left as specified in advance), while the fingers of both hands receive in the same short period of time several touches, he can seldom report correctly.

To put the hands in the position of the Japanese illusion, extend the arms with the backs of the hands together and the thumbs pointing downward. Now cross the wrists, still keeping thumbs down, interlace the fingers, and clasp the hands. Now bring the hands toward the chin by flexing the elbows, then bring the elbows down until they touch the sides of the body, at the same time rotating the clasped hands through about 270° until the thumbs point upward.[10]

If a functional anesthesia produced in one hand by hypnotic suggestion behaves like an organic anesthesia, it should make no difference whether the *S*'s hands are put into this position of confusion or not; with the hands clasped in this position he should be able to count correctly the number of touches received by the 'good' hand, no matter whether or how many times the 'anesthetic' hand is stimulated. If, however, the anesthesia behaves as if simulated, the *S* should give a great many erroneous reports on the number of touches felt on the 'good' hand, just as does the normal person when put into this situation.

Normal. Before the ability of the hypnotic *S* can be studied, it is necessary to investigate the extent of the normal *S*'s ability to count the touches on one hand when both, in the confusion-position, are being touched.

Fifteen normal *S*s, university students, were tested. All but *D* and *O* were men. The instructions given, after the hands had been put into position, were:

Close your eyes. You will be touched on the fingers of both hands. Count the number of times you are touched on the fingers of the left hand. No finger will be touched twice in succession. Do not estimate the number, but count as well as you can.

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[9] A. Binet and C. Féré, *Animal Magnetism*, 1888. Cited by Hull, *op. cit.*, 251.

[10] Drawings of the steps to be followed in taking this position are found in C. van Riper, An experimental study of the Japanese illusion, this JOURNAL, 47, 1935, 252-263. Van Riper in this paper deals with the effect of this position on the *S*'s ability to move his fingers when they are supplied with numbers and *E* calls out the number of the finger to be moved.

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The *S*'s thumbs were never touched. No report was ever made to the *S* as to the nature or the extent of his errors.

The touches were delivered by the *E*, who touched the fingers of the left hand, and an assistant, who touched the fingers of the right hand. The stimulators were pieces of rubber taken from ordinary large rubber erasers and had dimensions of 1.5 x 0.5 (the surface applied to the skin) x 2 cm. They were attached to thin strips of brass (11 x 1.5 x 0.03 cm.), which in turn were fastened to wooden sticks of a size convenient for the hand. The brass strips projected over the end of the wooden stick 3.5 cm. A wire fixed above the brass strip marked the amount of bending of the strip necessary to produce a pressure of 75 grm. Care was taken to insure that the *E*'s and the assistant's touches were equally intense. The *E*'s touches were applied at a variable rate, which did not exceed 2 per sec. A stop-watch was used to time the touches so that the maximum rate might not be exceeded. The touches on the hand selected for counting should not be delivered faster than the *S* can count them; a fair check on the rate was afforded by the fact that the *E* himself had to count the touches as he delivered them. The assistant's rate did not have to be strictly controlled, as the *S* did not have to count the touches, but it is believed that the rate rarely, if ever, exceeded 2 per sec.

Ten series of touches were applied to each *S*. Each series consisted of 20 sets of stimulations ranging in number from 11 to 30 applications on the critical hand. The order of these 20 stimulations was determined by chance (numbered cards were used and shuffled before each series was made up). Five series were given in the first hour of experimenting, and 5 in the second hour, which came after two or three days. To be sure that the *S* knew what he was to do, he was first given 11 or 12 touches on the left hand, while the assistant also was touching him. His report on this first stimulation was not recorded.

*S*s were scored thus. The errors made in each of the 20 reports in a series were added without regard to sign (*e.g.* the error was 4 if the *S* called 11 touches either 7 or 15). The record for each *S* presented in Table I consists of a set of 10 numbers representing the sum of errors in each series. If the *S* said that he lost count, the particular number on which he lost count was repeated at the end of the series. Losing count was infrequent.

These results, given in Table I, show large individual differences and great variation, due no doubt to the fact that many factors influence the *S*'s report, such as the number of times the assistant stimulates, and the rate of stimulation. A greater refinement of the method, to control more factors, would no doubt reduce the variation somewhat but would probably not eliminate it wholly. The bottom row of the table shows the mean number of errors made by the 15 *S*s in the 10 series. It shows that, taken as a group, the *S*s showed a considerable improvement in their ability, even though they had no knowledge of the correctness of their reports.

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TABLE I

TOTAL ERRORS OF NORMAL *Ss* IN DISTINGUISHING BETWEEN TOUCHES ON THE TWO HANDS WHEN THE HANDS ARE IN THE CONFUSION-POSITION

Ss	Series										Totals
	1	2	3	4	5	6	7	8	9	10	
A	65	16	23	12	9	4	10	3	4	5	151
B	65	62	31	34	28	34	19	22	16	9	320
C	52	43	47	49	53	45	23	43	39	30	424
D	110	49	43	37	28	17	21	23	16	26	370
E	38	13	6	9	7	4	3	16	3	0	99
F	69	45	36	12	24	8	8	4	2	7	215
G	61	61	38	72	55	67	66	46	55	63	584
H	32	16	33	38	31	28	46	39	87	84	434
I	111	52	37	41	53	27	13	7	4	7	352
J	177	137	149	88	138	118	84	44	102	67	1104
K	40	60	41	23	18	6	4	5	3	3	203
L	79	48	26	45	42	32	45	43	45	52	457
M	60	65	58	19	10	6	17	2	3	5	245
N	99	69	65	51	39	65	92	94	42	59	675
O	43	28	25	27	45	24	30	26	23	20	282
Av.	73	51	44	37	39	32	32	28	30	29	394

Hypnotized. Five hypnotic *Ss* (all men), including 3 university students and 2 graduates (not students), were used. All the *Ss* were very good somnambulists and had complete amnesia for events of the trance. None had knowledge of the nature of the experiment. Of course it is likely that the *Ss* could infer its nature while acting as *Ss*. In order to protect himself from fakers (whom he has sometimes encountered in experimental work) *E* had each *S* sign a statement as follows: "I, realizing that the experiment performed on me will probably be published in a scientific journal, solemnly declare that I was not faking or imitating the hypnotic trance but that I was genuinely hypnotized and do not remember the events of the experimental periods."

The procedure used with the hypnotized *S* was as follows. An anesthesia of the right hand and arm was suggested, and his sensitivity was tested by pinching, pressing, and pricking his hand. If he declared that he sensed nothing, he was then blindfolded by tying a thick newspaper around his head. (After experiences with malingering in the experiment on hypnotic blindness already cited, no chances were taken with the ordinary bandage-blindfold.) The *S*'s hands were then put into the position of the Japanese illusion, and the following instructions were given:

You can feel nothing with your right hand. You will now receive a number of touches, and since you can feel nothing with your right hand, they will be felt only on the fingers of the left hand. Count the touches received by the fingers of your left and and report the number as soon as they cease. No finger will be touched twice in succession. Do not estimate, but count as well as you can.

From this point on the procedure was exactly the same as that followed in the case of the normal *Ss*, except that the sensitivity of the hand was tested once or twice in every series.

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TABLE II

TOTAL ERRORS OF HYPNOTIZED Ss IN COUNTING TOUCHES ON A SENSITIVE HAND AND IGNORING IMPRESSIONS ON AN ANESTHETIZED HAND WHEN THE HANDS ARE IN THE CONFUSION-POSITION

Ss	Series										Totals
	1	2	3	4	5	6	7	8	9	10	
P	93	70	83	47	84	57	45	35	37	45	496
Q	36	14	35	26	37	24	24	24	35	23	278
R	18	7	9	31	13	4	7	16	9	4	118
T	33	42	40	37	69	35	22	12	30	25	345
U	38	46	68	79	55	38	60	40	75	60	559
Av.	44	36	47	44	52	32	32	25	37	31	359

Table II shows the results of the work on hypnotized *Ss*.

Comparison of the normal and hypnotized. A comparison of the data in the two tables shows that there is no reason for claiming that the hypnotic *Ss* can perform this task better than the normal *Ss*. The mean total number of errors made in the 20 series by the normal *Ss* is 394. Three of the hypnotic *Ss* made fewer errors, three made more than this number. The average numbers of errors in each of the 10 series, placed side by side for comparison, are as follows:

Ss	Series										Totals
	1	2	3	4	5	6	7	8	9	10	
Normal	73	51	44	37	39	32	32	28	30	29	394
Hypnotized	44	36	47	44	52	32	32	25	37	31	359

The hypnotic *Ss* are superior to the normal in the first and second series but inferior in the fifth and equal, or nearly equal, in the remaining series. If we neglect the first two series, the degree of improvement in the task is about the same for both kinds of *Ss*. From this comparison it may be concluded that the suggestion of anesthesia in the right hand does not affect the ability of the hypnotized *Ss* to count the number of touches received by the left hand when the hands are in the confusion-position. The differences between the two groups in the first and second series, if significant, must be explained as due to greater concentration on the part of the hypnotized *Ss* or some similar cause. If we attempt to explain this superiority as due to the suggestion of anesthesia, we can find no reason why this superiority should not have persisted through the remaining series.

Qualitative observations. In a large number of cases the hypnotized *Ss* reported a number which was less, in some cases considerably less, than the number of touches applied to the left hand. In a number of cases when there was a considerable difference between the numbers of touches applied

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by the *E* and the assistant, the *S* would report the number applied by the assistant on the supposedly anesthetic hand.

Some control experiments were done with each of the hypnotic *S*s in the trance after the main experiment was over. The *S* held his hands in the confusion-position while the *E* touched him only on the left hand. The *S* also put his hands, palms down, on the table, with a distance of about 50 cm. between them, and both *E* and assistant stimulated the hand as usual. The *S*'s ability to report the number of stimulations received by the left hand in these two situations was practically perfect, as one would expect.

After the quantitative experimentation, each *S* had to answer the following questions in the trance. (1) Did all the touches seem to fall on the left hand? (2) Were you conscious of suppressing some touches that you felt, that is, not counting some of them?

In reply, all *S*s said that they had felt nothing on the right hand, that all touches came on the left hand. *P*'s answer was not typical of the rest. When asked, "Did you have the impression that all touches came on the left hand?" he said, "I can't say that I did." "Your right hand has been anesthetic?" "Yes." "Why did you say that you didn't have the impression that they all came on the left hand?" "Because I didn't know where my left hand was." "You're certain that you felt nothing with the right hand?" "I have felt with only one hand, the left." These answers suggest that the *S* did feel something with the right hand; he reported some confusion, but maintained that his right hand had felt nothing.

The answer given by all to the second question was that they had not been aware of receiving touches which were not counted. The *S*s were then asked, after the right hand had been rendered anesthetic by suggestion, to put their hands into the confusion-position again, and they were blindfolded. They were told to say "Now" whenever they felt a touch. Every *S* except *P* and *R* at one time or another reported "Now" when the touch fell on the right hand and failed to report when it fell on the left hand. *P*'s success seemed to depend on the fact that he was rather slow in reporting after being touched. *R* was rather prompt in reporting. It is significant that these two *S*s made the fewest errors among the hypnotic *S*s. They were both touched about 20 times, and in no case made an error.

At the conclusion of these experiments, the nature of the problem was explained to the *S*s. It was hoped that they might make some comments of interest, but they made none. This result was probably to be expected, since they were in the trance, a condition usually unfavorable (though not always) to the making of statements indicating independent or spontaneous thinking.

To be complete, this experiment should contain another division, in which various stimuli are applied to the 'anesthetic' hand and the *E* tries to obtain later from the *S*s a description of the stimuli received. This course was not followed, since the nature of the experiment had been explained to the *S*s and *E* thought that this fact would vitiate the evidential value of data so obtained.

Conclusions and Theoretical Considerations

(1) The suggestion of the anesthesia of one hand is effective only so long as the *S*'s hands are in a position which, in the non-trance state, would

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not prevent him from knowing, when one hand is stimulated, which one is being stimulated. If, however, the hands are clasped in a position which renders this accurate knowledge impossible, the suggestion of anesthesia has no effect on the *S*'s performance, and he can count the touches received by the supposedly insensitive hand (when both are touched) no better than can a normal person who has no suggestion of anesthesia and who has his hands in the same position of confusion.

(2) The effect that the suggestion of anesthesia produces is an illusion on the part of the *S* that one of his hands is actually insensitive and that all the touches come to the unaffected hand. The only alternative to this conclusion is that the *S*s are consciously lying. There are several reasons for rejecting this latter hypothesis; namely: (a) The number of *S*s who, after reflecting on their past experiences, have ever admitted such a deception is either zero or very small. In the writer's experience, none ever has. (b) It seems unreasonable to suppose that a *S* who can be trusted to carry out instructions faithfully in an experiment in the normal state is so transformed by hypnosis that he knowingly lies to the *E* and undergoes painful stimulation to carry out the same purpose of deception. (c) It is probably easy to produce the illusion referred to, and the instructions given may act as a determinant of it, just as certain instructions may facilitate the production of a 'normal hallucination' in an unhypnotized person who is a trained introspector.[11] Such an illusion arose spontaneously in one of the normal *S*s tested and disturbed the testing so much that he had to be discarded. Through one of the first series, this *S* had the impression that all touches were falling on his right hand, and he could make no report at all on the number received by the left hand, which he had entirely "lost."

(3) Since the *S*s report that they are not failing to count some of the touches and we take this statement as truthful, and since at least in some cases there is evidence of an active process of suppression (*e.g.* 21 touches may be given and only 9 reported), it must be assumed that certain dissociated processes are working at the task of 'sorting out' or discriminating, so far as is possible, the impressions received from the two hands. These dissociated processes are not primarily cognitive—that is, they are not 'dissociated ideas'—but are conative in nature. The suggestion of anesthesia produces an illusion that an anesthesia actually exists and also a dissociation of certain conative tendencies which work, without the knowledge of the principal integrate of personality, in every way possible to make it appear to the *E*, whom the *S* wishes to please and to obey, that an anesthesia

[11] A. S. Edwards, An experimental study of sensory suggestion, this JOURNAL, 26, 1915, 99-129.

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has actually been produced. This theory owes to Professor McDougall's general theory of hypnosis in terms of submission the idea that the dissociated processes are primarily conative in nature. While this study fails definitely to support McDougall's theory that anesthesias are genuine, nevertheless it offers considerable evidence in support of his general ideas on the subject of hypnosis.

This theoretical formulation is supported strongly, in the writer's opinion, by his study of hypnotically produced blindness, to which he has already referred.

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